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(54) Title: COLOUR REDUCTION IN CANOLA PROTEIN ISOLATE

(57) Abstract: In the recovery of canola protein isolates from canola oil seeds steps are taken to inhibit the formation of colouring components and to reduce the presence of materials tending to form colouring components, to obtain a lighter and less yellow canola protein isolate.

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INTERNATIONAL SEARCH REPORT

Application No
PCT 03/00934

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 A23J1/14 A23J3/14 A23L1/27 A23L1/277

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A23J A23L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, FSTA, WPI Data, BIOSIS

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P,X	WO 02 089597 A (BURCON NUTRASCIENCE MB CORP ;BARKER LARRY D (CA); MURRAY E DONALD) 14 November 2002 (2002-11-14) page 8, paragraphs 3-5; claims 1-12	26
Y	US 6 005 076 A (MURRAY EDWARD D) 21 December 1999 (1999-12-21) cited in the application column 5, paragraph 3; claims 1-51; examples 1-4	14-64
Y	US 5 844 086 A (MURRAY EDWARD DONALD) 1 December 1998 (1998-12-01) cited in the application the whole document	14-64

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
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- *O* document referring to an oral disclosure, use, exhibition or other means
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- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *G* document member of the same patent family

Date of the actual completion of the international search

19 February 2004

Date of mailing of the international search report

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INTERNATIONAL SEARCH REPORT

Application No
PCT/CA 03/00934

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	EP 0 289 183 A (UNIV TORONTO) 2 November 1988 (1988-11-02) page 2, line 21 page 4, line 46-53 page 5, line 4,5; claims 1-19 ---	14-18, 26-54
Y	DATABASE FSTA 'Online! INTERNATIONAL FOOD INFORMATION SERVICE (IFIS), FRANKFURT/MAIN, DE; KOZLOWSKA H ET AL: "Removal of undesirable substances from rapeseed flour using alcohols." Database accession no. 84-2-07-g0541 XP002257459 abstract & ZESZYTY NAUKOWE AKADEMII ROLNICO TECHNICZNEJ W OLSZTYNIE, TECHNOLOGIA ZYWNOSCI 1983 INST. INZYNIERII & BIOTECH. ZYWNOSCI, ART, OLSZTYN, POLAND, ---	19-25, 55-58
Y	US 4 410 554 A (SAILER DONALD E) 18 October 1983 (1983-10-18) column 5, line 65-68; claim 1 ---	59-61
Y	US 3 732 108 A (EAPEN K ET AL) 8 May 1973 (1973-05-08) page 1-2 ---	62-64
A	US 3 971 856 A (DAFTARY RASIK D) 27 July 1976 (1976-07-27) column 3, line 64 -column 4, line 28 ---	62-64
A	US 3 926 940 A (CIRCLE SIDNEY JOSEPH ET AL) 16 December 1975 (1975-12-16) claim 1 ---	19-25, 55-58
A	YEW-MIN TZENG ET AL: "PREPARATION OF RAPESEED PROTEIN ISOLATE BY SODIUM HEXAMETAPHOSPHATE EXTRACTION, ULTRAFILTRATION, DIAFILTRATION, AND ION-EXCHANGE" JOURNAL OF FOOD SCIENCE, INSTITUTE OF FOOD TECHNOLOGISTS. CHICAGO, US, vol. 53, no. 5, 1 September 1988 (1988-09-01), pages 1537-1541, XP000000647 ISSN: 0022-1147 the whole document ---	14-58, 62-64
A	DD 148 290 A (BRUECKNER JUERGEN;KROLL JUERGEN; MIETH GERHARD; POHL JOACHIM) 20 May 1981 (1981-05-20) claims 1-4; example 1 ---	14-58, 62-64
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INTERNATIONAL SEARCH REPORT

Application No
PCT/CA 03/00934

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	XU L ET AL: "Removal of phenolic compounds in the production of high-quality canola protein isolates" FOOD RESEARCH INTERNATIONAL, vol. 35, no. 1, 2002, pages 23-30, XP002257457 ISSN: 0963-9969 the whole document	14-58, 62-64
A	KOZLOWSKA H ET AL: "THE INFLUENCE OF SELECTED TECHNOLOGICAL PROCESSES ON THE IMPROVEMENT OF RAPESEED MEAL AND FLOUR FEED QUALITY PART 1. THE INFLUENCE OF HYDROTHERMAL TREATMENT AND ETHANOL EXTRACTION ON CHEMICAL COMPOSITION OF RAPESEED PRODUCTS" NAHRUNG, vol. 35, no. 5, 1991, pages 485-489, XP008023278 ISSN: 0027-769X the whole document	14-58, 62-64

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CA 03/00934

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☒ Claims Nos.: 1-13
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
see FURTHER INFORMATION sheet PCT/ISA/210
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this International application, as follows:

see additional sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☒ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 14-58,62-64

A process of preparing a canola protein isolate from canola oil seed meal, which comprises the following steps:

- (a) extracting the canola oil seed meal to cause solubilisation of the protein;
- (b) separating the aqueous protein solution;
- (c) increasing the protein concentration while maintaining the ionic strength by use of a selective membrane technique to provide a concentrated protein solution;
- (d) diluting into chilled water to cause the formation of discrete micelles;
- (e) settling the micelles to form a protein micellar mass;
- (f) recovering the micellar mass from the supernatant, wherein one or more of the following colour reduction steps take place:
 - extraction of the protein using an aqueous salt solution containing an anti-oxidant (step (a));
 - washing the canola oil seed meal with an alcohol (before step (a));
 - subjecting the concentrated protein solution to diafiltration (after step (c));
 - extracting dried canola protein isolate with an aqueous alcoholic solution (after step (f));
 - inactivate myrosinases contained in the oil seeds (before step (a)).

2. Claims: 59-61

A process of preparing a canola protein isolate from canola oil seed meal, which comprises step (a) to (f) and between (c) and (d) a pasteurisation of the concentrated protein solution to form a pasteurised protein solution.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box I.2

Claims Nos.: 1-13

Present claims 1-13 relate to a method defined by reference to a desirable characteristic or property, namely a process "which results in a canola protein isolate having a decreased colour".

The claims cover all methods having this characteristic or property, whereas the application provides support within the meaning of Article 6 PCT and/or disclosure within the meaning of Article 5 PCT for only a very limited number of such methods. In the present case, the claims so lack support, and the application so lacks disclosure, that a meaningful search over the whole of the claimed scope is impossible.

Independent of the above reasoning, the claims also lack clarity (Article 6 PCT). An attempt is made to define the method by reference to a result to be achieved. Again, this lack of clarity in the present case is such as to render a meaningful search over the whole of the claimed scope impossible. Consequently, the search has been carried out for those parts of the claims which appear to be clear, supported and disclosed, namely those parts relating to the subject-matter of claims 14-64:

A process for preparing a canola protein isolate from canola oil seed meal, which comprises process steps (a) to (f), wherein one or more of the following colour reduction steps take place:

- extraction of the protein using an aqueous salt solution containing an anti-oxidant (step (a));
- wash the oil seed meal with an alcohol (before step (a));
- diafiltration of the concentrated protein solution (after step (c));
- extraction of the dried protein isolate with aqueous alcoholic solution (after step (f));
- inactivation of myrosinases in the oil seeds (before step (a)).

The applicant's attention is drawn to the fact that claims, or parts of claims, relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure.

INTERNATIONAL SEARCH REPORT

Information on patent family members

Application No

PCT/CA 03/00934

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 02089597	A	14-11-2002	WO 02089597 A1	14-11-2002
			CA 2445147 A1	14-11-2002
			US 2003125526 A1	03-07-2003
US 6005076	A	21-12-1999	US 5844086 A	01-12-1998
			AT 188349 T	15-01-2000
			AU 706698 B2	24-06-1999
			AU 1434197 A	22-08-1997
			CA 2244398 A1	07-08-1997
			DE 69701086 D1	10-02-2000
			DE 69701086 T2	13-07-2000
			DK 886476 T3	04-12-2000
			EP 0886476 A1	30-12-1998
			GR 3032970 T3	31-07-2000
			HK 1019543 A1	11-05-2001
			JP 2977286 B2	15-11-1999
			JP 11506619 T	15-06-1999
			PL 328086 A1	04-01-1999
			WO 9727761 A1	07-08-1997
			CN 1214614 A ,B	21-04-1999
			ES 2142659 T3	16-04-2000
			PT 886476 T	30-06-2000
US 5844086	A	01-12-1998	AT 188349 T	15-01-2000
			AU 706698 B2	24-06-1999
			AU 1434197 A	22-08-1997
			CA 2244398 A1	07-08-1997
			WO 9727761 A1	07-08-1997
			CN 1214614 A ,B	21-04-1999
			DE 69701086 D1	10-02-2000
			DE 69701086 T2	13-07-2000
			DK 886476 T3	04-12-2000
			EP 0886476 A1	30-12-1998
			ES 2142659 T3	16-04-2000
			GR 3032970 T3	31-07-2000
			HK 1019543 A1	11-05-2001
			JP 2977286 B2	15-11-1999
			JP 11506619 T	15-06-1999
			PL 328086 A1	04-01-1999
			PT 886476 T	30-06-2000
			US 6005076 A	21-12-1999
EP 0289183	A	02-11-1988	US 4889921 A	26-12-1989
			AT 73617 T	15-04-1992
			CA 1311877 C	22-12-1992
			DE 3869183 D1	23-04-1992
			EP 0289183 A2	02-11-1988
			JP 1027433 A	30-01-1989
			JP 2798390 B2	17-09-1998
US 4410554	A	18-10-1983	NONE	
US 3732108	A	08-05-1973	NONE	
US 3971856	A	27-07-1976	AU 1099076 A	18-08-1977
			BE 838716 A1	16-06-1976
			CA 1074177 A1	25-03-1980
			DE 2608782 A1	16-09-1976

INTERNATIONAL SEARCH REPORT

Information on patent family members

Application No
PCT/03/00934

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 3971856	A	DK 87976 A	04-09-1976
		EG 11996 A	30-06-1978
		ES 445010 A1	01-05-1977
		FI 760394 A	04-09-1976
		FR 2302695 A1	01-10-1976
		GB 1511950 A	24-05-1978
		IL 49015 A	31-01-1979
		JP 51112543 A	05-10-1976
		NL 7600920 A	07-09-1976
		NZ 179936 A	20-06-1978
		ZA 7600339 A	26-01-1977
US 3926940	A 16-12-1975	GB 1372026 A	30-10-1974
		AU 458767 B2	06-03-1975
		AU 3539471 A	10-05-1973
		BE 775023 A1	05-05-1972
		DE 2155093 A1	10-05-1972
		ES 396699 A1	16-11-1974
		FR 2113539 A5	23-06-1972
		IL 38082 A	22-10-1974
		IT 1053685 B	10-10-1981
		NL 7115256 A	09-05-1972
		ZA 7107431 A	26-07-1972
		CA 951312 A1	16-07-1974
DD 148290	A 20-05-1981	DD 148290 A1	20-05-1981